

THE IMPACT OF INFORMATION TECHNOLOGY ON OBTAINING BANK LOANS IN NIGERIA

banking, banking loans, liberalization, frequency of internet use, consolidation exercise

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Objectives

The main objective of the study is to determine the effect of the frequency of internet use on the volume of bank loans, to show the impacts of the liberalization of the Nigerian telecommunication sector on the ICT infrastructure, especially in the banking sector.

Summary

This study examines the impact of frequency of internet use on the probability of getting a bank loan in Nigeria. Among others, the first finding of this study shows that the reform in Nigeria's information, technology, and communication (ICT) sector in the early 1990's increased mobile phone penetration and internet coverage in Nigeria, and these in turn boost the volume and levels of banking electronic transactions.

Conclusions

The impact of ICT reforms in Nigeria affects the way banks do business in Nigeria. Banks now advertise most of their product on the internet, thus making the internet one of the platforms on which borrowers can get more information about bank loans and other bank products.

Key words: *(Banking Sector, Nigerian Economy, Liberalization, Information and Communication Technology (ICT))*

Language: English

Grade:

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1. Introduction

Nigeria is the biggest economy in Africa as at 2015, it is the most populous country in Africa and it is an emerging economy. This research is important as it helps to determine the ease of access of the Nigerian SMEs and the informal economy to business finance. Since SMEs are engines of growth that creates wealth for millions of people all over the world, this research is also important in highlighting the importance of SMEs and the informal sector financing in economic growth in Nigeria. This research also establishes the impact of the liberalization of the Nigerian ICT sector on the formal banking sector, the SMEs, the Nigerian informal economy and households' purchasing powers in Nigeria.

1.1. Background

Nigeria has one of the highest ratio of youth to adult population in the world (World Bank, 2015). Nigeria's youthful population is one of the main drivers of her information and communication technology (ICT) sector, which includes mobile/cellular phone and the internet telecommunication devices service providers, consumers and other stakeholders. The Nigerian ICT sector is a very important sector of the Nigerian economy since the full liberalization of the Nigerian ICT sector in the early 2000s (International Telecommunication Union report, 2007).

This sector provides a new ICT related markets and jobs for the country's teeming youthful population. The fruit of the liberalization program in Nigeria is evident as the country has the highest rate of internet users in the whole of sub-Saharan Africa (GSMA, 2015). For example, Nigeria has seen improvements in its internet user per 100 people from 38 in 2013 to 47.4 in 2015 per data from the World Bank (2015).

The huge success recorded by the liberalization program of the ICT program notwithstanding, accessing capital for business start-ups and small and medium scale enterprises (SMEs) remains a huge challenge (Central Bank of Nigeria Quarterly Report, 2014). The lack of dependable financing sources for small-scale

business and participants in the Nigerian informal economy means that every available information that increases the chance of getting a business loan is very significant.

In Nigeria, the Internet is one of the growing, cheapest and effective platforms of sources of information in Nigeria (GSMA, 2015). Since most individuals connect to the internet on smart phones, internet connection via mobile phone is more popular than other means of internet platforms and infrastructure. As Nigerian businesses, including banks also advertise heavily on the internet, access to the internet, and full exploitation of all the business opportunities the internet offers may prove very crucial for potential users of bank loans. However, a crucial assumption of this study is that Nigerian banks share important information about bank loans on popular media platforms, including the internet. The validity of this assumption is important to this study. Data from the panel data component of the Nigerian's General Household Survey (PNGHS), and open data sources such as the World Bank, the ITC, the IMF and other sources used in this research paper to show the validity of these assumptions.

A research into how potential borrowers take advantage of the information on the availability of bank loans from the internet may prove very important in deepening our understanding about the role of ICT in business financing in developing and middle income countries. In this research paper, I am going to investigate the link between the frequency of internet use and successful application for a bank loan.

1.2. Research problem

The mystery surrounding most developing and lower income countries' inability is its to generate wealth which has been a hot academic topic in the last 6 decades (Muhammed S. et. Al, 2015). At the heart of this issue is the crucial role of Small and Medium Scale enterprises (SMEs) as the engine of growth in almost all economies of the world. SMEs thrives in business-friendly environment and governments all over the world often pass laws to ease businesses' access to capital.

However, the informal economy also plays a very crucial role in a developing economy like Nigeria. The informal economy refers to that aspect of the economy that is not under strict governments regulations in terms of lax employment regulations, tax laws and so on. Since the informal economy contribute about 58% of Nigerian GDP (FMBNP, 2015), this research paper will not make any distinctions between the informal economy and the SMEs.

1.3. Research question

After serious and proper consideration, I arrived at my research questions

1. Does the liberalization of the ICT sector in the early 2000s in Nigeria promote formal banking business in Nigeria?
2. Does the frequency of internet use predict the success of getting a bank loan?
3. Do Nigerian banks discriminate based on demographics; especially on gender and educational status they make their loans decisions?

1.4. Research objective

To study the proposed research questions, this study will conduct the following:

- Review the literature on the nature of the banking system in Nigeria, with a view to finding any major reform in that sector that promotes bank products, particularly bank loans through non-traditional media platform like the internet.
- Review the literature on recent reforms in the ICT sector in Nigeria.
- Identify the gaps in the literature on banking system and the ICT sector in Nigeria.
- Construct hypotheses around the impact of the internet on getting bank loans in Nigeria.
- Construct hypothesis on the impact of demographic factors on the probability of getting a bank loan in Nigeria.
- Collect data through two main sources: The Panel component of the Nigeria general Household Survey and the World Bank.
- Analyse collected data
- Reporting the findings and making conclusions
- Discussing the potential future research and managerial implications.

Following this agenda, the study will have a structure consisting of six main sections: Introduction, Literature Review, Methodology, Findings, Discussion and Analysis, and Conclusion. At the end of the literature review, a conceptual model is introduced to visualize the relationships between key constructs and concepts and how they are connected to the research questions.

2. Literature Review

Since the 1960s, several economic models and theories have been proposed to alleviate poverty and create wealth in the world's poorest nations. Bold reforms in the financial sector to boost access to business loans is one of such proposals. Since inadequate access to financial services kills entrepreneurship initiative, the nature of such reforms has long been a subject of academic interest to development economists.

One proposed reform argues in favor of deepening the formal financial intermediary, while another school of thought favors reforming the role of informal financial intermediaries (Todaro, 2013). It should be noted that these financial sector reforms might themselves be endogenous to reforms in another sector of the economy. For example, liberalization of the information and communication technology (ICT) sector in Nigeria in the late 1990s was part of the country's financial sector's reform package, which took place during 2004/2005.

As a developing country, Nigeria has tried both methods of financial sector reforms at some periods. Discussing these reforms in Nigeria, especially how they addressed the issue of access to loans by the business community is one of the focus areas of this chapter. A general overview of the financial intermediation process, the agency theory and transaction costs, and symmetric information is the starting point of this chapter.

2.1 Agency Theory, Financial Intermediaries, and Transaction Cost

Financial development has been linked to accelerated economic development and poverty alleviation. However, financial development presupposes commitment to deepening the process of financial intermediation. Development economists have shown that formal financial intermediaries may not be the only route to financial

deepening, especially in the developing economies where the resources for smooth running of formal financial intermediary may be lacking (Mishkin, 2015).

Given the success stories of informal financial and microfinance institutions in places like India, Kenya, Nigeria, and other developing countries, alternatives to the formal financial intermediary exist, but formal banking institution still offer the best services in terms of transaction cost and efficient services (Aliyu, M; Yusuf.A, 2014).

Access to cheap loans from formal financial sectors is still minimal in most developing countries as low-income earners were effectively shut out of the formal financial sector in sub-Saharan Africa until very recently. The advent of the mobile banking and other technology-driven means of delivering financial services to the poor changed the story of formal financial sector in sub-Saharan Africa (Mwangi and Ndung'u, 2009).

In agency theory, with respect to the banking sector, the principal is the party that entrusts some funds to another party, called the agent, to manage on behalf of his behalf. The principal is the depositor, while the agents are the banks. In this depository-agency relationship, the banks perform specific functions to the depositor like honoring checks, giving bank guarantees to depositors, providing online services including allowing depositors to use their platforms for online bill payments and so on.

However, financial intermediation, the focus of this study, is the most function of banks in any modern economy. Banks are financial intermediaries in the sense that they fund the deficit sector from the funds they obtain from the surplus sector for safekeeping. A full-fledged and innovative financial intermediation is crucial to economic growth and development.

Most developing countries Financial intermediate reduce transaction costs thus making lending and borrowing cheap (Mishkin, 2015). By reducing transaction cost, financial intermediation makes it easy for business and Small and Medium scale enterprises (SMEs) for have access to cheap start-up capitals and working capitals.

Since SMEs are proven engine of growth and development, a smooth running financial intermediary is more crucial than ever for a developing country like Nigeria.

Reducing asymmetric and adverse information between borrowers and lenders is one of the outcome of financial intermediate functions of banks. Asymmetric and adverse information is when one party in a transaction has more information than the other party, and fair and mutually beneficial transaction cannot take place between them thus (Akelorf, 1970). Banks bridge information asymmetry by acting as intermediaries between the lending and borrowing parties, the result of which reduces the information gap between the two parties. Since financial intermediaries are crucial for economic growth, Nigeria and other developing countries have a lot to gain from functioning financial intermediate systems.

The decade 2000-2009 was a very important one in the banking industry in Nigeria. During that period, two important events, which changed the landscape of the Nigerian financial industry, occurred. The first event was the liberalization of the telecommunication sector of the Nigerian economy, while the second one was the 2004/2005 banking consolidation exercise. I will examine these issues one after the other, starting with banking consolidation exercise and the effect of this program on the depositor base, and financial intermediaries in Nigeria.

2.2 A brief Overview of the Nigerian Banking Sector: Post Consolidation Era

Nigeria is a major economic power house in sub-Sahara Africa (World Bank, 2015). Nigeria carried out a major reform of its financial sector in 2004/2005. Christened “The Banking Consolidation exercise”, the reform was geared toward making Nigerian banks more competitive and solvent by solidifying their capital bases. The reforms resulted in several mergers and acquisitions of commercial banks in Nigeria. Before the reform, there are 107 banks in Nigeria in 2003. However, after the reforms, the number of banks were reduced to 25. (Hesse, 2007).

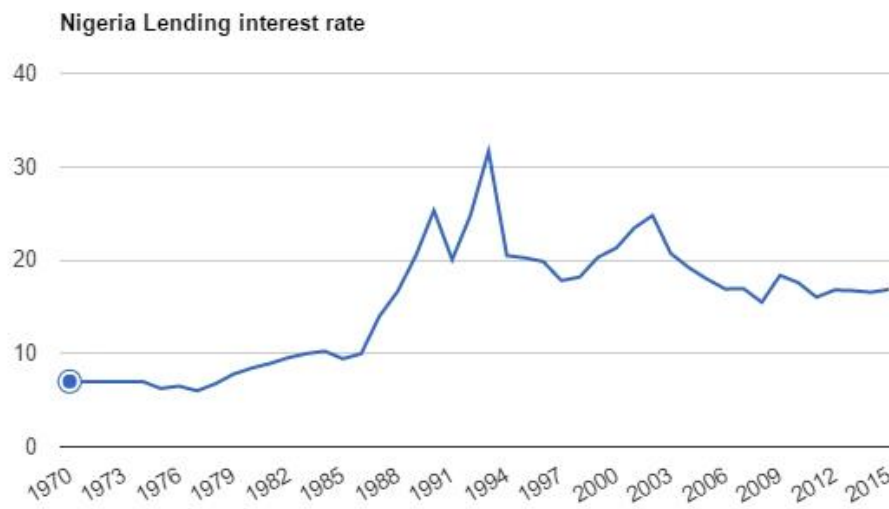
Several arguments were advanced by the proponents and policy makers who support the banking consolidating exercise. Charles Soludo¹, the governor of the Central Bank of Nigeria and the widely-acclaimed author of the consolidation policy paper, summed up the need for the reform in these words: “Nigerian banks are traders, trading in foreign exchange, in government treasury bills...”. Soludo (2004) also argues that by the end of the consolidation policy implementation Nigerian banks are going to increase their savings mobilization capacity, thus boosting the ability of the banks to give soft loans to manufacturing and industry.

A crucial provision of the reform is the increment of capital base of Nigerian banks to at least 25 billion Naira². All the existing banks were given 18 months to meet minimum capital base provision. Banks who cannot meet this provision are going to get their banking license revoked. However, the central bank of Nigeria actively encourages the private commercial banks to raise capital from the stock exchange and thus go public. Banks that cannot meet the required capital base and failed to raise capital from the secondary market are encouraged to merge with bigger banks.

The consolidation exercise was widely adjudged as successful. Per Soludo (2004), post-consolidation banking indicators show narrowing deposit-lending rate margin, huge capital base, adoption of standard corporate governance, improvement in self-regulation, loan to the private sector, among the consolidated banks, and huge investment in ICT by the banking sector.

¹ Prof. Charles Soludo is a former governor of the Nigerian Central Bank

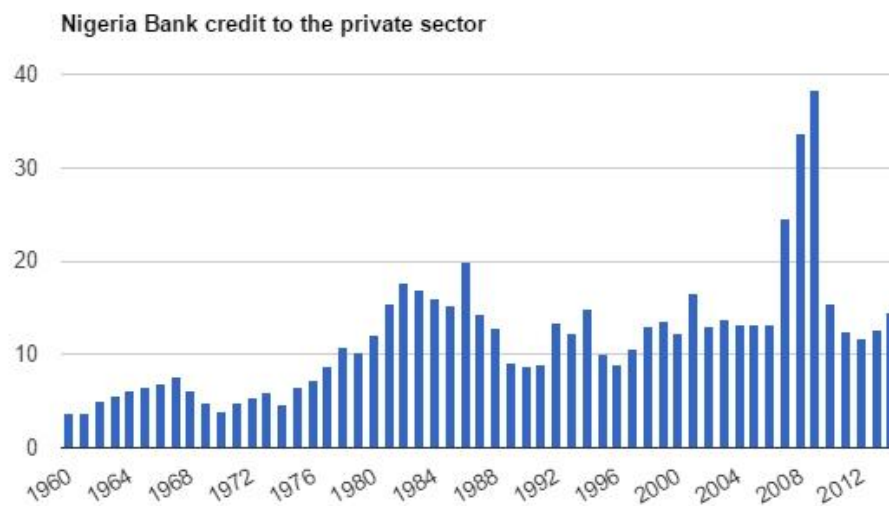
² N25 Billion is approximately \$110 million USD in today's dollar adjusted for inflation and using a conversion rate of N300=1 USD.



Source: TheGlobalEconomy.com, The World Bank

Figure 1: shows a plot of lending rate in Nigeria since 1970.

Figure 1 above shows the bank lending rates in Nigeria narrowed considerable after 2004 from its zenith in 1994, a period associated with bank failures in Nigeria.



Source: TheGlobalEconomy.com, The World Bank

Figure 2: Shows the levels of Nigerian Bank credit to the private sector, 1960-2012

Figure 2 above shows loans to the private sector as a percentage of GDP from the 1960 to 2014. Per the figure, there was a huge spike in lending rate in the years immediately after the consolidation exercise.

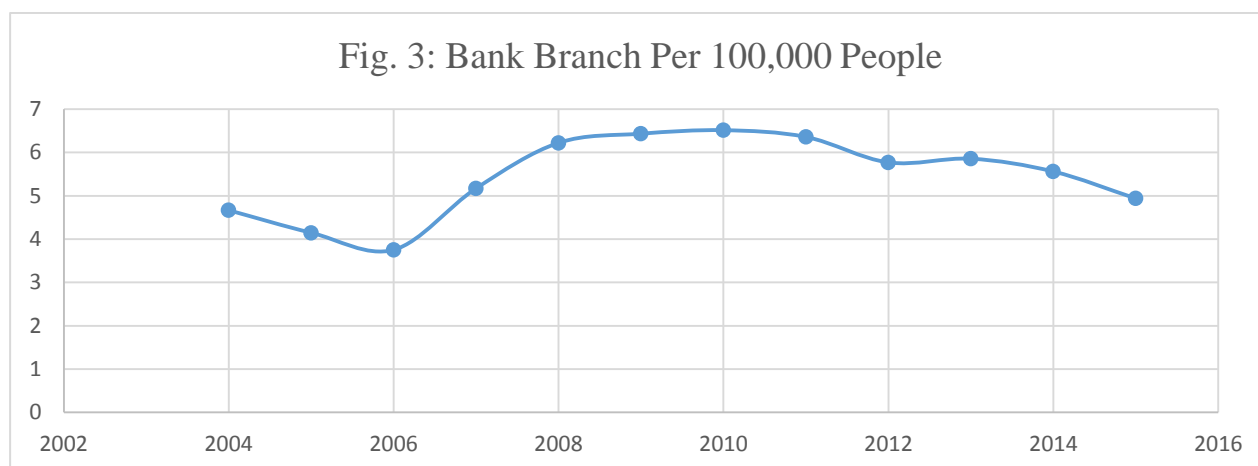


Figure 3: Bank Branches per 100,000 people 2004-2015. S Source: World Bank

Figure 3 above also shows the trend line of the number of commercial bank branches per 100,000 people, and it shows a huge spike from 2008 to 2011 before trending downwards again in 2012, possible because the number of bank branches are not catching up with population growth.

Table 1 below shows some post-consolidation era banking indices and ICT adoption by Nigerian banks. Unfortunately, pre-consolidation ICT related data is not available. In table 1, most of the financial intermediation indices went up after 2005, and the trends are likely to continue into the near future (GSMA, 2015; World Bank 2015).

Table 1: Post Consolidation Banking Indices, Mobile Phone and Internet Adoption

Year		Bank		Depositor		Mobile	Internet	
		Branches	Per	Per	1,000	Subscription	Users	Per
		1,000	Adults	Adults		Per	100 People	
						100 People		
2005	0.675298	4.15		.		13.32	3.55	
2006	1.765317	3.75		.		22.55	5.55	

2007	4.437807	5.16	293.59	27.45	6.77
2008	8.567256	6.21	309.17	41.66	15.86
2009	11.36931	6.43	460.66	47.96	20
2010	11.13867	6.51	468.98	54.66	24
2011	11.84285	6.35	500.36	57.96	28.43
2012	11.39082	5.76	638.71	66.80	32.8
2013	13.54432	6.00	662.05	73.29	38

Table 1: This table shows some links between banking sector and ICT variables after the consolidation program. Source: The World Bank data base (2014)

Despite the gains of the banking consolidation reform, lack of deep financial intermediation remains a problem in the Nigeria financial sector. Per the Central Bank of Nigeria, huge economic activities still happen in the informal sector of the Nigerian economy (Quarterly Report, Central Bank of Nigeria, 2014). Thus, the informal sector undermines the financial intermediation process.

2.3 The Concept of Informal Economy: The Nigerian Experience

The informal sector is a sector where small-scale employment of labor takes place and whose activities are usually outside the monetary authorities and government's control. Thus, the informal sector undermines effective implementation of fiscal and monetary policies. Most economic activities in the informal sector are carried out in cash, and this itself harms the financial intermediation process. Economic activities are not taxed nor monitored by the government.

The economic activities in the informal sector are also not included in the Gross Domestic Product of a country. Per World Bank (2015) estimate, approximately 60% of the labor force in developing countries are engaged in the informal sector. Meanwhile, close to 40% of the GDP in less developed countries are done in the informal sector of the economy, and these contributions to national economies are unaccounted for thus.

'From World Bank (2014) estimates, the size of Nigeria's informal sector is close to 65% of her GDP. The economic activities in the informal sectors are painfully difficult

to observe, monitored and defined. In its most obscure forms, traditional occupations dominate informal economic activities such as farming, fishing, and pottery etc., occupations that are handed down from generation to generation.

Most often than not, due to bureaucracy, lack of records, institutional deficiencies and other problems associated with developing countries, these economic outputs are undercounted at best. Some of these economic activities also take place in major cities in Nigeria and other developing economies. In fact, policy failure to integrate these informal economic activities is one of the leading reasons for inadequate access to bank loan.

Per ease of access to bank loans, and other bureaucracies facing the informal economies, one of the most influential book on the informal economy is Hernando De Soto's "*The other path: The Invisible Revolution in the Third World*" (1989). De Soto (1989) contend that most economic activities are informal in nature due to governmental bureaucracy. For example, getting a business registered in places like Nigeria can take months (World Bank, 2014).

Consequently, excessive regulation and bureaucracy are catalysts for boom in informal sector activities. To demonstrate the seriousness of this government bureaucracy, De Soto tried to register a small garment factory in Lima, Peru. De Soto and his team successfully register the business after over a year and close to 100 administrative steps.

Despite his unpleasant experience posing as a local entrepreneur, De Soto heap praises on the spirit of entrepreneurship. De Soto concluded that high level of poverty in developing economies is not due to wanting entrepreneurial spirit, but by governments, which failed to recognize the entrepreneurial spirits of their own citizens (Ruben Alvarado, 2001).

As noted above, substantial economic activities still take place in the informal sector of the Nigerian economy, and this poses some problems for the financial intermediation process because most economic transactions in the informal economy are not carried out with financial instruments, they are instead carried out with cash.

However, the monetary authorities in Nigeria are making rules to lessen the stranglehold of the informal sector on the Nigerian economy. For example, A policy tagged “Cash-less Nigeria”³ which capped daily cash withdrawals by individuals at \$600 (equivalent in the Nigeria currency) was imposed in top 10 Nigerian commercial cities in 2012, and the policy has gone nationwide from June 1, 2014.

2.4 Liberalization of the Nigerian Telecommunication sector: The Golden Decade (2002-2012)

The action plan of the reform in the ICT sector of the Nigerian economy was conceived around 1997/1998. Since Nigeria’s independence from the Great Britain in 1960, the Nigerian government has been a major shareholder in the telecommunication sector. The government’s control over the ICT sector was solidified by the Nationalization decree of 1973. Thus, the private sector played a very minimal role in the ICT sector before the 2002/2003 ICT sector liberalization and reform in the Nigeria.

Per the International Telecommunication Union ITU (2009), the number of telephone connections in Nigeria increased by nearly 10 times between 2001 to 2010 from 1 per 100 people in 1998. By 2015, there were 69.87% telephone subscriptions (mobile phones) per 100 inhabitants (ITU, 2016). The Information and Communication Telecommunication (ICT) revolution of the late 1990s also contributed to the pressure to liberalize the telecommunication sector in sub-Sahara Africa (Buy et.al, 2008).

From the GSMA data (2015) data, coverage and mobile phone penetration grew from 10% in 1999 to over 77% in 2015. The GSMA (2015) projected that 93% of Africa will be mobile phone subscribers by 2020. Internet connection and mobile phone services are strongly linked in Nigeria, just as in most sub-Sahara Africa countries. Nigeria moved from 2G network to 3G mobile phone network in 2011. Presently, data from the GSMA (2015) shows that roughly 25% of mobile connection in sub-Saharan Africa are based on 3G network. This number was up from 10% in 2010. Per projections, about 75% of the Nigerian population will be connected to the 3G by

³ More Information on the cashless Nigeria can be found here: <http://www.cenbank.org/cashless/>

2018. However, only 1% of mobile networks are on the 4G network, compared to a global average of 11%.

Affordable and availability of cheap smart phones from China and other far east countries are the driving force behind the growth in 3G and 4G mobile phone internet connections in Nigeria. From GSMA data, mobile phones imported from these countries costs around price \$20-\$35 in Nigeria. Adoption of smartphones and mobile broadband in Nigeria also imply easy access to the internet by data subscribers. More importantly, since banks may also find it cheaper to advertise their products on their websites instead of traditional media like Television, radio, and the print media⁴, internet connection remains one of the ways of getting information on bank loans in Nigeria. In view of these facts, I present the research questions I posed in chapter one again:

- does the liberalization of the information communication technology (ICT) sector during the periods 1999/2000 boost economic activities in general, and the banking sector? To answer this question, we need to focus on the Nigerian economy, dominated by informal economic activities.
- Second, does the frequency of internet use predict the success of getting a bank loan? This question is intrinsically linked with the first one because if we observed an upward trend in the number of people using internet around the period of 1999/2000, then the liberalization of the ICT sector can be deemed a success with respect to generating externalities on banking sector and other sectors of the economy.
- Third, I want to determine the determinants of a successful bank loan application in Nigerian. Here, I am going to focus on the extent to which demographic variables determine the chance of getting a bank loan in Nigeria.

⁴ All Nigerian newspapers can be access on several websites, one of which is: <http://www.money.aabnigeria.com/mny/internet-money/list-of-all-nigerian-newspapers-on-the-internet>

3. Methodology

This section discusses and analyses the data and variables used for this study, the variables. I am also going to discuss the method of analysis used in this study.

3.1 Data

This purpose of this study is to determine the impact of information technology on the success of obtaining a bank loan in Nigeria. I use two main sources of data for this study: The Panel Component of the Nigerian General Household Survey (PNGHS) and the world bank database. In this section, I plan to use the two waves of PNGHS and the world Bank database to address the trend in ICT related variables pre- and post-consolidation exercise and the reforms in the ICT sector in Nigeria. However, I am going to focus on the PNGHS to determine the impact of ICT and demographic variables on the chance of getting a bank loan in Nigeria.

Due to the two different data sources, the nature of the research questions of this study, and limited data availability in some cases, there is no fixed period for this study. Generally, however, this study covers the period 1990-2014, and I will reiterate the period covered each time I use these data sources.

3.2 Variables: The World Bank Data and the Structure of the Nigerian Economy

The World Bank macroeconomic database is used in answering the first question. This data source covers macroeconomic data for all countries. It is an open source dataset, and it is available in different file formats like excel file, comma separated file (CSV) and other sophisticated formats. This data set is divided into 21 different topic codes, ranging from agricultural and rural development to trade. For Nigeria, the data source covers the period 1960-2015, and the economy and growth, the financial sector, infrastructure, agriculture and social topic codes are used for this study.

To get a glimpse of the size of the informal sector in Nigeria, I used the percentage of the population employed in the agricultural sector as a proxy of employment in Nigerian agricultural sector. Lack of data makes this choice an unavoidable one. However, the size of the informal sector will be analysed again at the household level since the rich panel household survey captures that variable.

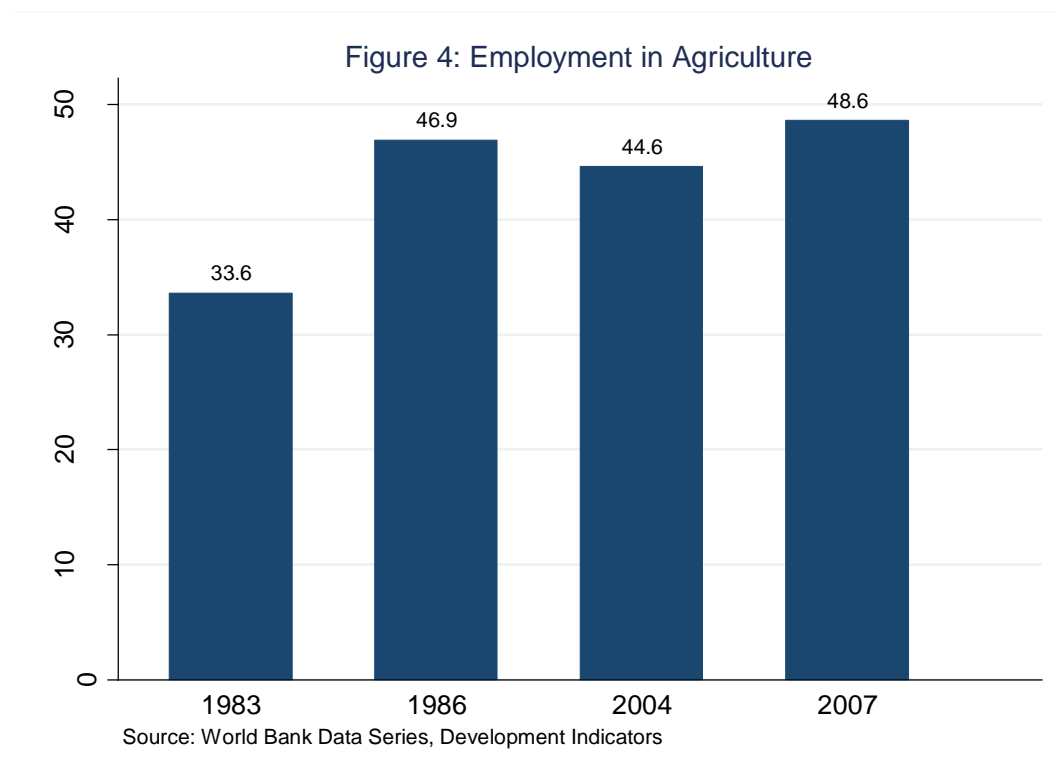
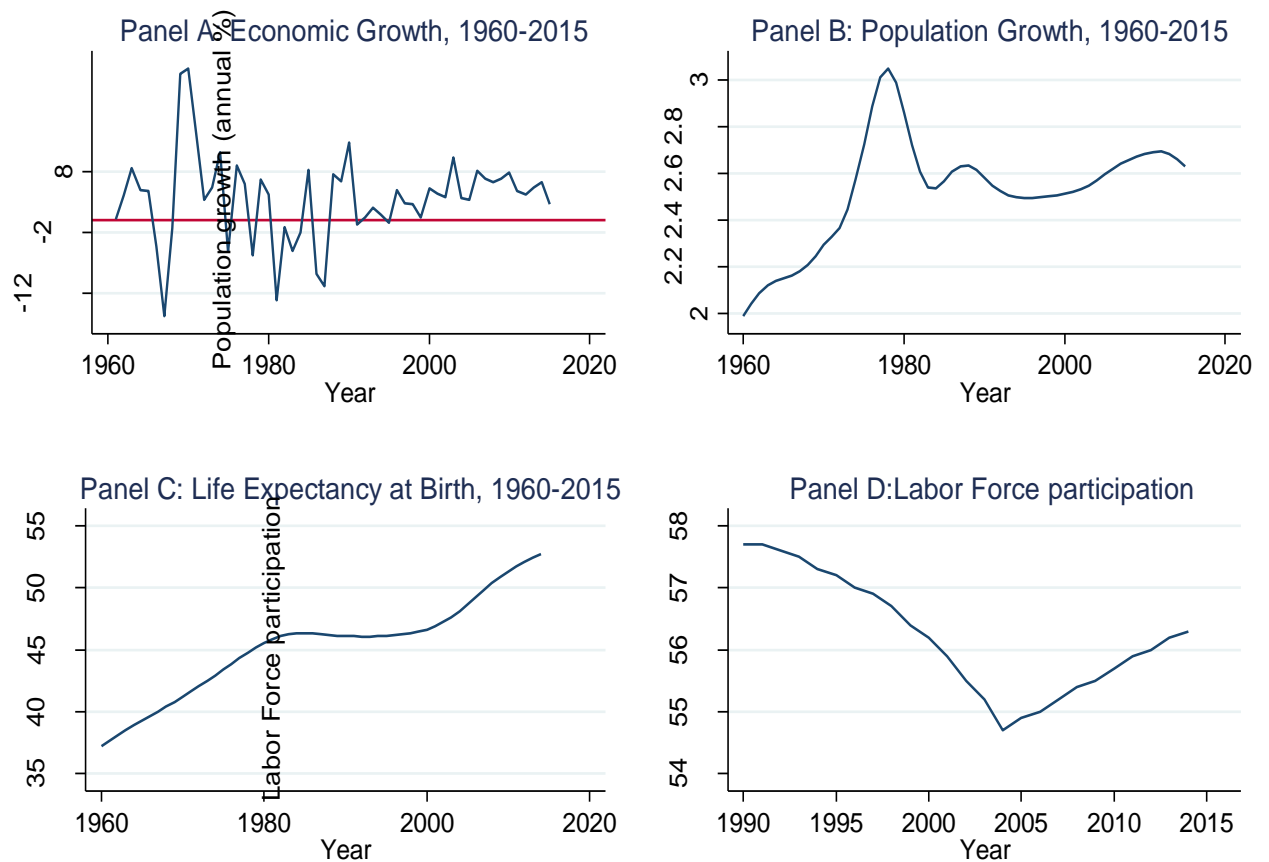


Figure 5: This Figure shows the influence of Agriculture on the Nigerian economy.

Figure 4 above shows the employment in the Nigerian agricultural sector as a percentage of total employment. In 1983, 1986, 2004, and 2007, the years for which data is available, agriculture accounts for 33.6%, 46.9%, 44.6%, 48.6% respectively. Comparably, in the US and Europe, agriculture contributes less than 2% and 5% in most member states respectively (World Bank, 2016) around the same period. Thus, the huge contribution of agriculture to the Nigerian economy is an indicator of an economy dominated by the informal sector. More so, the agricultural sector in Nigeria is still dominated by small-scale subsistence farming (World Bank, 2016).

Apart from the first glimpse of the structure of the Nigerian economy, the World Bank macroeconomic data series also contains data that gives us an overall idea about the Nigerian economy. To give a complete picture of the Nigerian economy, I used GDP per capita, population, population growth, labour force participation rate, economic growth rate, Life expectancy at birth, and the labour force participation Rate. Trends in these variables are going to give us some insight into the nature of the Nigerian economy and how demographic variables may influence the chance of getting a bank loan.

Figure 5: Macroeconomic Indicators of the Nigerian Economy, 1960-2015



Source: World Bank Data Series, Development Indicators

Figure 5 above shows these indicators. At 2.7% per annum growth, the Nigerian population growth rate is one of the fastest growing in the world, but the trend has somewhat moderated since the 1990s. This indicator is good for the economy as the gains from ICT growth per capita can be fully harnessed. Bar the recent slump, the Nigerian economy enters a recovery period around the same time that the ICT sector was fully liberalized in the early 2000s, and this trend continues well into 2013 as seen on the Economic Growth chart in panel B of Figure 5. Life expectancy at birth hovers around 55 years in 2015, and labour force participation rate was 56.4% in 2015.

Birth and the labour force participation Rate. Now I want to look present an overview of the data in from the main source of data set for this study: the panel component of the Nigerian General Household Survey.

3.3 Variables: The Nigerian General Household Survey Panel Component (NGHSP).

The panel component of the Nigerian General Household Survey (NGHS) is the main source data for this study. The NGHPS is a nationally representative sample of 5,000 household who are surveyed biennially. The NGHPS was introduced in 2010 as a subsample of the Nigeria General Household Survey.

Two waves of the panel survey have been published; first wave was published in 2011 and the second wave was published in 2013. The National Bureau of Statistics (NBS) in conjunction with the World Bank, and Bill and Melinda Gates foundation (BMGF) designed the NPGHS.

The NGHSP is divided into three sections: household, community, and agricultural survey levels. Most of the variables used in this study come from the household level survey. The household questionnaire provides data on demographics, education, health, labor and time use, food and non-food expenditure of households, household non-farming non-farm income generating activities, food security and shocks, safety nets, housing conditions, assets, information and communication technology and other sources of household income.

Data are collected under two board categories in two visits: post planting and post-harvest periods. The survey design asks different sets of questions in each period, and in most cases, these questions are different, thus the incidence of missing data and double counting of variables are reduced to the barest minimum.

The NGHSP community questionnaire solicits information on access to infrastructure, community organizations, resource management, changes in the community, key events, community needs, actions, achievements, and local retail price information. Some of the variables used in this study also comes from the community questionnaire.

I am going to represent a full summary statistics of interesting variables in a later section, but a glimpse of the general household summary statistics is presented in Table 2 below:

Table 2: Sample Statistics of Household Members, 2010

VARIABLES	N	Mean	SD	Min	Max
Individuals Household Members	31,287	4.552	3.159	1	31
Sex (0=Male, 1=Female)	28,262	0.503	0.500	1	2
Age	28,265	22.90	19.66	0	120
Marital Status (0=single/others, 1=Married)	28,262	0.323	0.467	0	1
Number of wives	1,076	2	0.643	1	9
Fathers Educ. (1=None, 1=High Sch. Or More)	1,203	0.147	0.354	0	1
Mothers Educ. (1=None, 1=High Sch. Or More)	1,169	0.0830	0.276	0	1
Head of Household (1=yes, 0=No)	28,273	0.826	0.379	0	1

In Table 2 above, 31,287 individual household members who represent 5,000 households are captured during the first wave of the survey in 2010. An average household size is 4.552 members, with the minimum and being 1 and 31 members respectively. About half of the surveyed individuals are male, and the other half are female. 82.6% of the individuals surveyed are head of their households.

The mean age in the first wave of the NGHSP is 22.90 years. About 32.3% of the sample are married, and an average person in the sample has 2 wives. About 17.7% of the survey individuals have fathers who are high school educated or more, but only 8.3% of their mothers are high school or higher educated. This summary statistics is a window into the survey I am going to use to analyze research questions two and three.

3.4 Methods of Analysis

Univariate and simple regression analysis are used in this study to answer the research questions posed at the beginning of this study. This study uses simple mean, median, standard deviation, and difference in differences (D-in-D) of the mean values for univariate analysis. A simple regression analysis will be as the multivariate analysis for this study. The D-in D univariate analysis makes sense since the ICT adoption rate, proxies by frequency of using the internet in a week, is hypothesized to influence the success of getting a bank loan at the household level.

The D-in-D analysis of the univariate data is constructed around 2000-2003, the time of liberalization of the Nigerian ICT sector. However, due to data limitation, the D-in-D analysis can only be used to provide insight into the first research question that is the impact of the liberalization of the ICT sector on the Nigerian economy in and the banking sector. Thus, to answer the first question, I am going to use 2002, the median year as the event year for the D-in-D analysis of the data sourced from the World Bank.

Since liberalization of the ICT sector started in 2001 and was concluded by 2003. Here, I am going to compare the differences-in-differences in the adoption rate between ICT variables: fixed telephone line and mobile phone adoption rates before and after 2002. An increase in mobile phone adoption rate over landline adoption rate after 2002 would thus be interpreted as successful implementation of the liberalization of the ICT sector.

Unfortunately, however, data limitation does not permit me to make a direct comparison between banking sector variables and ICT. However, I am going to supplement the D-in-D between the banking sector and mobile phone variable mentioned earlier with other univariate analysis.

In contrast to the first research question, I am going to use both univariate and multivariate analyses to answer the other two-research question. Both data analyses techniques are made easier by availability of the Nigerian General Household Survey.

4. Findings

4.1 Liberalization of the ICT Sector, Economic Activities, and the Banking Sector in Nigeria

I am going to present my findings in this section. The first finding I am going to present in this chapter covers the impact of reforms in the ICT sector and the level of banking activities in Nigeria. To answer this question, I use the world bank macro-level data. But a word of caution about the world bank's macro-level data: the macro-level data may be subjected to data and error measurements. Aker and Mbiti (2010) specifically warned that data limitation, especially at the micro-level, makes the task of examining benefits of ICT reforms to economic activities a very difficult one. Thus, analyzing data from the macro-level to connect ICT adoption and economic benefits thereof may be subjected to measurement errors.

However, since the World Bank data are collected from various government agencies around the world, I believe that the measurement errors in the macro level data used in the section are minimized. Table 3 shows summary of some selected ICT, economic and mobile phone rate adoption data.

Table 3: Summary Statistics: The Nigerian Mobile phone sector, ICT liberalization and the economy (1960-2014)

VARIABLES	N	Mean	SD	Min	Max
Mobile Phone Subscription per	44	13.10	25.05	0	82.19

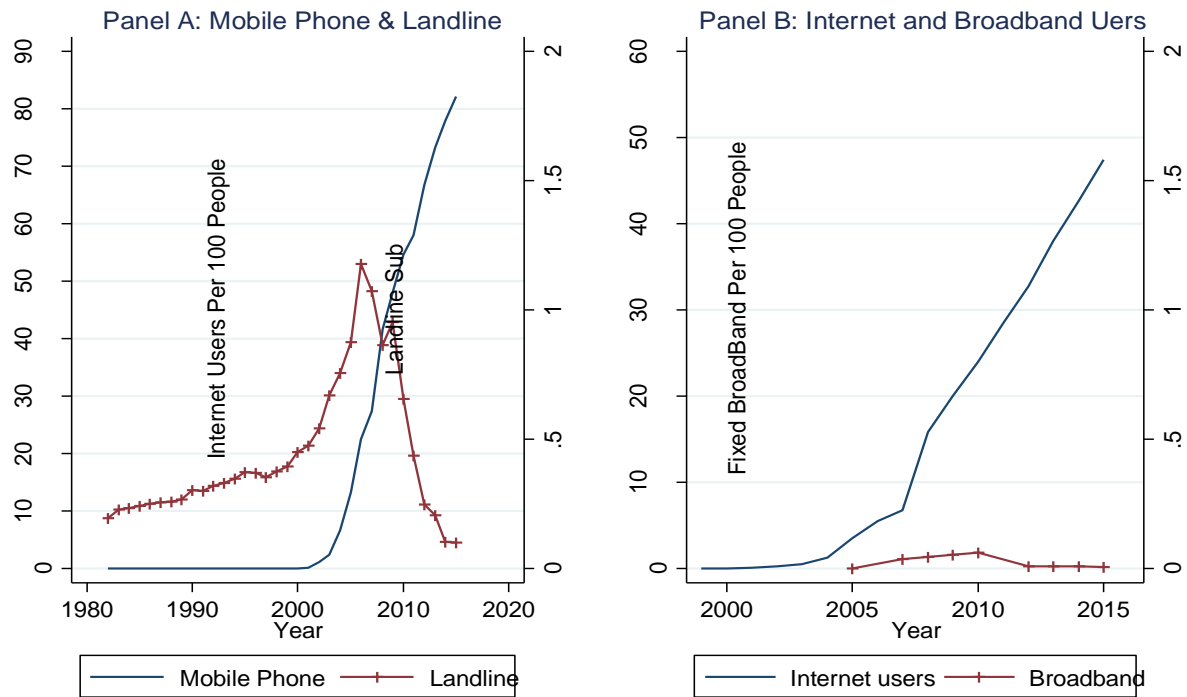
100

Landline Subscription per 100	36	0.424	0.279	0.0454	1.178
Fixed Broadband Subscription	9	40,277	35,871	500	99,108
Fixed Broadband Sub. Per 100	9	0.0256	0.0234	0.000358	0.0621
No. of Secured Internet Servers	14	166.5	158.5	1	474
Internet Users per 100	21	12.74	16.30	0	47.44
GDP Growth	55	4.152	8.335	-15.74	25.01
Bank Branches Per 100,000	12	5.449	0.921	3.754	6.513
Bank borrowers per 1,000	8	28.77	1.926	26.15	30.82
Depositors per 1,000	9	514.3	144.9	294.0	661.9
Domestic Credit (% of GDP)	56	11.81	6.520	3.697	38.35

The minimum and maximum values of fixed landlines per 100 people are very close, and this result may be due to a worldwide trend of household abandoning landlines for mobile phones. More importantly, after adjusting for population growth, banking variables sector variables such as bank branches per 100,000 people, bank borrowers per 1,000 people, and depositors per 1,000 people also see some decent increases. However, no meaningful conclusion was reached based on minimum and maximum values.

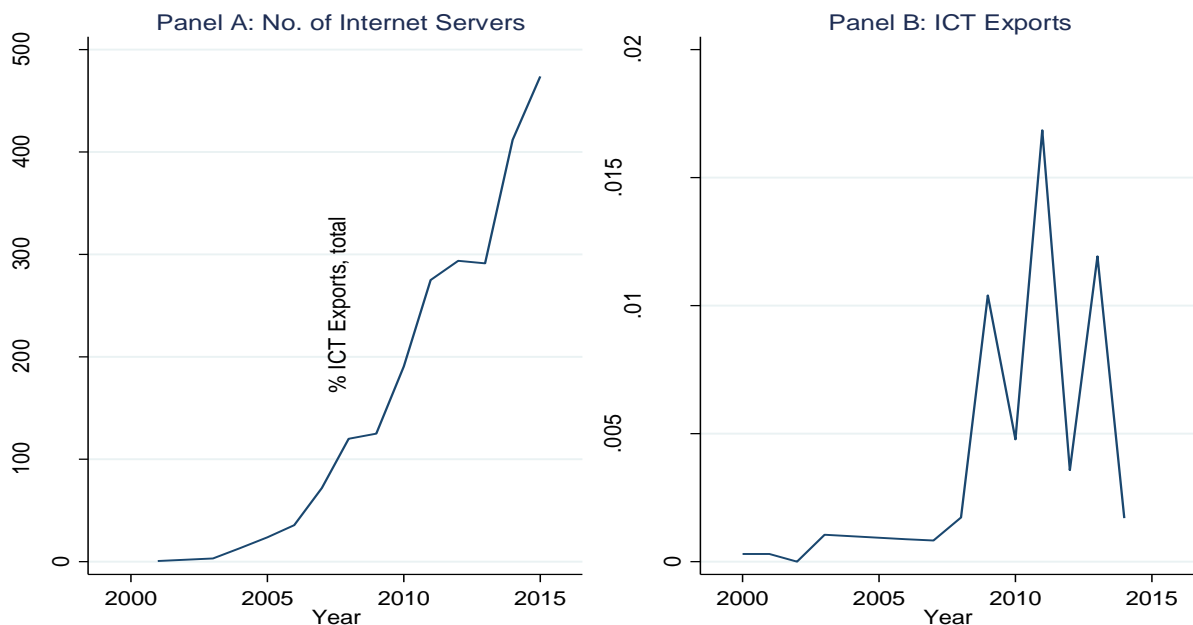
Using the difference-in-difference approach, I plan to answer the first research question on how reforms in the ICT sector promotes banking activities by comparing the pre-and post-reform outcomes in the ICT sector data. However, before we turn our attention to D-in-D analysis, we can catch a glimpse of the trend of some selected variables in the graphs below

Figure 6: The Nigerian ICT Sector



Source: World Bank Data Series, Development Indicators

Figure 7: The Nigerian ICT Sector



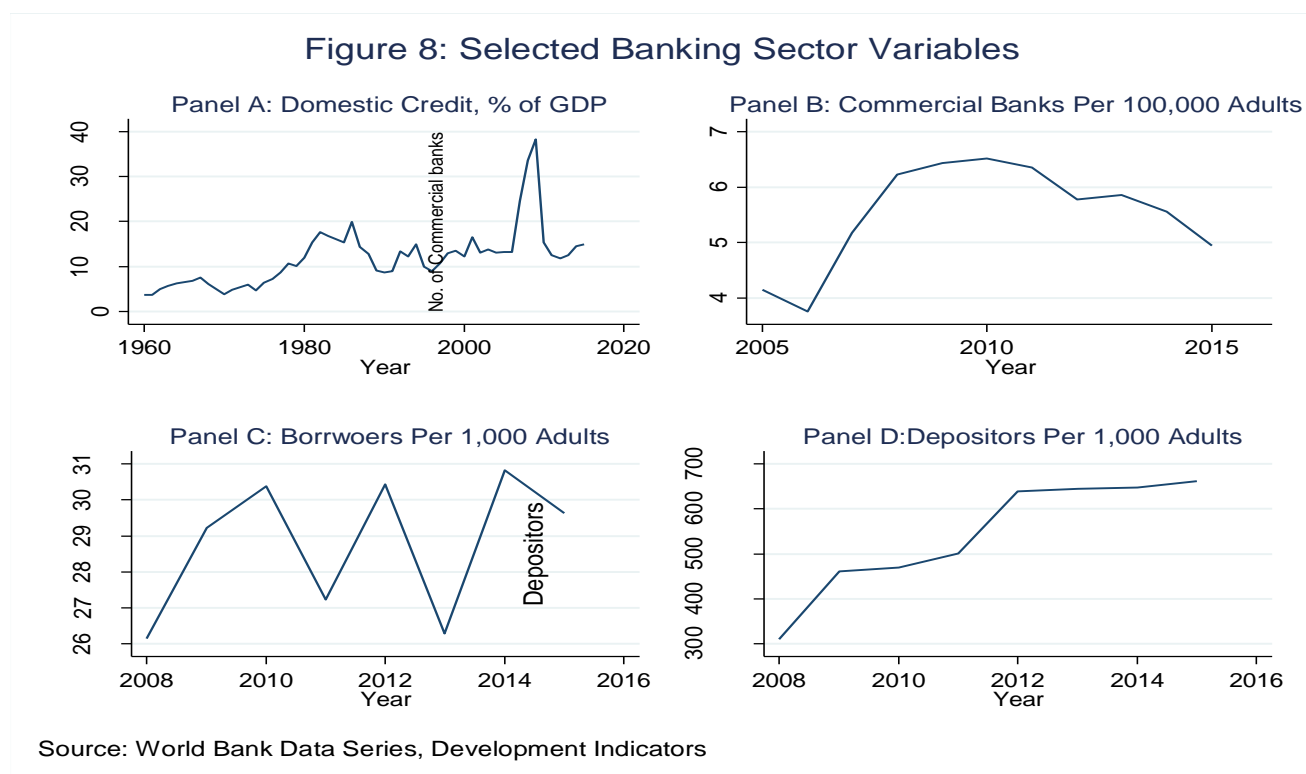
Source: World Bank Data Series, Development Indicators

In Panel a of Figure 6, mobile phone subscription per 100 has been trending upwards since the year 2000, while fixed landlines per 100 has been trending in the opposite direction. In panel B of Figure 6, the number of internet users per 100 people stands

at 47, while fixed broadband internet users per 100 has been since 2009. Thus, not only has mobile phone overtaken fixed landlines, fixed internet broadband is falling out of use.

This trend is not surprising given that fixed internet broadband and fixed landlines are relatively more expensive than internet data packages, which comes from smart mobile phone subscriptions. These trends also lend credence to the assertion in chapter 2 that most Nigerians now use their mobile phones subscription as a major source of internet connection. Cheap smartphones from the Far East (China, Taiwan, Japan etc) makes the transition from broadband internet to mobile phone internet subscription very easy and smooth as I also noted in chapter 2.

Selected banking sector variables shown in Figure 8 below:



While panels B and C of Figure 8 above do not show any clear trend, panels A and D shows some trend, at least around the liberalization of the ICT period. Lack of clear trends in three of the four figures (that is Panels B, C, and D) above is perhaps due to limited availability of banking sector data on the macro-level. In any case, in Panel A, there is a clear spike in domestic credit as a percentage of GDP. Similarly, there is an upward trend in depositor per 1,000 adults in panel D beginning from 2008.

To answer the research question on the how the reform in the ICT Sector promotes banking sector activities in Nigeria, I use the simple means D-in-D approach in Table 4 to test validity of results in Figures 6-7. Specifically, I test the differences in means of the differences between mobile phone subscriptions per 100 people and fixed landline subscriptions per 100 people. The result is shown in the Table 4 below:

Table 4: Averages of Mobile Phone and Fixed Landline Subscriptions
Per 100 people

	Pre-Lib	Post Lib	Differences	t-stat.	D-in-D	t-stat.
Phone Subscription						
				-		
Mobile phone	0.0369(0.0656)	34.145(22.793)	-0.349(.0431)	24.3427		
						-
Land line	0.386(0.0477)	0.772(0.282)	33.373(22.937)	4.601	33.722	4.6491*

The result for sample means discrepancies in difference as shown in Table 4 above. I used 2002 as the year of the liberalization event. I chose 10 years pre-liberalization, and 10 years post-liberalization period for this purpose. In other words, the period 1993-2002 is regarded as the control period, while the period 2003-2012 is regarded as the treated period. In addition, mobile phone per 100 people is regarded as the fixed group, while fixed mobile phones per 100 people variables is regarded as the treated group.

The values in the brackets in Table 4 above are the standard deviations. The D-in-D value of 33.722 shows that the mean of the differences in differences of the sample means of phone subscriptions per 100 people and fixed landline per 100 people between pre-liberalization and post-liberalization period is significant at 1 percent level of significance. This result confirmed the trend observed in Figure 6 panel A, and in Table 3. Thus, the post-liberalization makes a difference in terms of mobile telephone and the internet adoption rate in Nigeria.

4.2 Frequency of internet use, Bank loan Applications and Success Rate of Getting a Bank Loan

In this section, I am going to turn my attention to analyzing the research question about the link between frequency of using the internet and the chance of getting a bank loan. The panel component of the Nigerian General Household Survey (NGHSP) will be used for this purpose. Some of the components of NGHSP has been addressed in section 3.3 of chapter 3. However, we still need to clean the data set by removing some individuals who are not the focus of this study from the panel component.

The major category of individuals who are not included in this study are individuals under the age of 18 years. There are at least two reasons for removing these individuals from dataset. High school education is typically completed at this age, and it is not legal to open a bank account for individuals under the age of 18 years old without the consent from at least a parent, or a guardian (Central Bank of Nigeria Bulletin, 2014).

Thus, these individuals are removed from the dataset. Eight individuals whose age have 999 are also removed from the dataset because I assumed this an error in the survey. The 2010 survey data set is shown in Table 5 below after cleaning the data set:

Table 5: Summary Statistics, 2010

VARIABLES	N	mean	sd	min	max
Individuals Household Members	12,388	2.632	2.312	1	31
Age	12,388	39.03	16.31	18	110

Marital Status (1=Married, 0=single/Others)	12,387	0.681	0.466	0	1
Educ. (0=None, 1=High School, 2=More)	11,451	1.821	0.547	0	3
Owned Mobile Phone? (0=No, 1=Yes)	12,045	0.773	0.419	0	1
No. of Mobile Phone Owned	5,541	1.064	0.495	0	12
Do you use Internet? (0=No, 1=Yes)	11,995	0.0473	0.212	0	1
Frequenc(0=None,1=Daily,2=Week,3=Less)	565	1.2858	1.3712	0	3
Any Bank Account (0=No, 1=Yes)	12,061	0.169	0.374	0	1
Borrowed from A Bank? (0=No,1=yes)	12,036	0.0177	0.132	0	1
Loan Turned Down? (0=No, 1=Yes)	12,032	0.112	0.315	0	1
Do you have a job (0=No, 1=Yes)	12,109	0.689	0.463	0	1
Wages/Month (in Nigerian Naira)	3,870	70,317	831,516	0	3,360,000
Household Head? (0=No, 1=yes)	12,388	0.631	0.482	0	1
Gender (0=Male, 1=Female)	12,386	0.534	0.499	0	1

Twelve thousand, three hundred and eighty-eight individuals are identified from 5,000 households in the 2010 sample after adjusting for people who are at least 18 years old. Most individuals in this sample have at least a high school education. Average Household has 2.632 people, females are 53.4% of the sample, 63.1% of the individuals in the 2010 survey are household heads, the average age in the 2010 sample is 39 years old, and an average person in the sample has two wives.

About 12% of the individuals in the 2010 survey applied for a bank loan, and only about 1.8% of people in the survey successfully got their loans approved. About 16.8% of the people in the survey has at least one bank account in a formal financial institution, while about 9.1% of the sample got a loan from informal financial institution, including construction group (*Esusu* etc.) individuals.

Overwhelming majority of the people in the 2010 sample has at least one radio. 77.3% of the sample have a mobile phone, and an average person in the sample has

at least one phone, with minimum and maximum phone owned being 0 and 12 respectively. 68.9% of the people in the sample are employed, and the average monthly income for an individual in the sample is N73, 317.00 (about \$165 per month).

Caution should be applied in interpreting and using income reported in most developing countries because measurement errors often affect them. It is common for people to work in kind for other, and most people keep their wealth in the form of livestock. Socio-economic status index (SES) is often used as a way around this problem.

However, the data used for this study is not sufficient to calculate the socio-economic index, so, we I am going to use the estimated income found in the NGHSP. Therefore, the income used in this study may not be truly reflective of actual income of some respondents in this study. The details on constructing the SES index can be found in Vyas and Kumaranayake (2006).

Table 6: Summary Statistics, 2012

VARIABLES	N	Mean	SD	Min	Max
Individuals Household Members	12,396	2.631	2.312	1	31
Age	12,396	41.59	16.59	18	110
Marital Status (1=Married, 0=single/Others)	12,309	0.676	0.468	0	1
Educ. (0=None, 1=High School, 2=More)	11,451	1.701	0.487	0	3
Owned Mobile Phone? (0=No, 1=Yes)	11,554	0.845	0.362	0	1
No. of Mobile Phone Owned	6,413	1.093	0.888	0	31
Do you use Internet? (0=No, 1=Yes)	11,542	0.0711	0.257	0	1
No. Internet Services	222	1.270	0.651	1	4
Frequenc(0=None,1=Daily,2=Week,3=Less)	804	1.126	1.265	0	3
Any Bank Account (0=No, 1=Yes)	11,755	0.192	0.394	0	1
Borrowed from A Bank? (0=No,1=yes)	11,727	0.0290	0.168	0	1

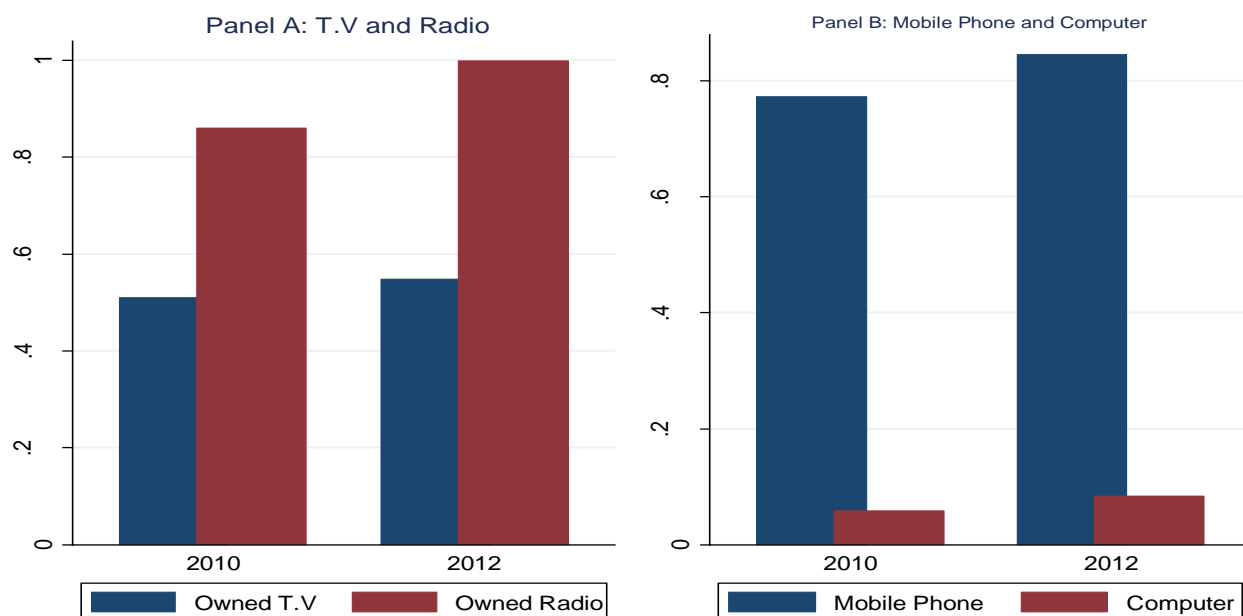
Loan Turned Down? (0=No, 1=Yes)	11,735	0.0940	0.292	0	1
Do you have a Job (0=No, 1=Yes)	11,546	0.734	0.442	0	1
Wages/Month (in Nigerian Naira)	3,520	78,639	426,992	0	1,904,000
Household Head? (0=No, 1=yes)	12,395	0.628	0.483	0	1
Gender (0=Male, 1=Female)	12,396	0.534	0.499	0	1

In the 2012-second wave of the NGHSP, I also removed individual who are less than 18 years old, and 12,396 are individuals identified from 5,000 households in this sample. Most individuals in this sample have at least a high school education. Average Household has 2.631 people, females are 53.4% of the sample, 62.8% of the individuals in the 2012 survey are household heads, the average age in the 2012 sample is 41.59 years old, and an average person in the sample has two wives.

About 12% of the individuals in the 2012 survey applied for a bank loan, and only about 2.9% of people in the survey successfully got their loans approved. About 19.2% of the people in the survey has at least one bank account in a formal financial institution, while about 9.81% of the sample got a loan from informal financial institution, including construction group (*Esusu* etc.) individuals.

Almost all the households in the 2012 sample has at least one radio. 84.5% of the sample have a mobile phone, and an average person in the sample has at least one phone, with minimum and maximum phone owned being 0 and 31 respectively. 73.4% of the people in the sample are employed, and the average monthly income for an individual in the sample is N78, 639.00 (about \$168 per month).

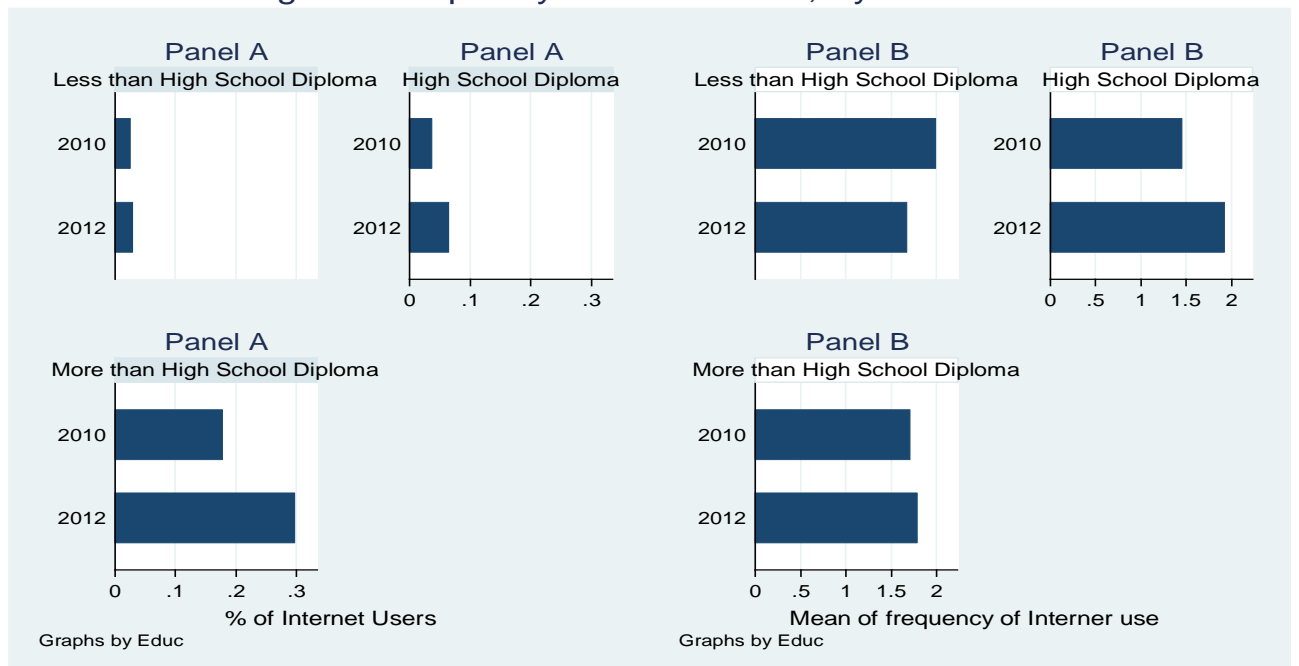
Figure 10: T.V and Radio, Mobile Phone & Computers



Source: The Nigerian General Household Survey, Panel Component

Figure 10 above compares the proportion of respondent television and radio in Panel A, and respondents who owned Mobile phones and computers in Panel B. It should be noted that while the percentage of respondents who owned computer is roughly the same between 2010 and 2012, the number of respondents who owned mobile phones increases by roughly 12%. These results show that internet connection in Nigeria is a lot connected to mobile phone ownership than computer ownership. We saw a similar trend in the macro-level data in section 3. Thus, the NGHSP confirms a similar trend in the macro-level data.

Fig. 11: Frequency of Internet Use, By Education



Source: The Nigerian General Household Survey, Panel Component

Figure 11 above shows internet and the frequency of internet use by educational attainment. In Panel A of the figure, internet use by educational attainment of people with less than high school diploma is least among the educational groups. Unsurprisingly, the group with the highest level of education has most internet users in both survey waves.

In panel B, the frequency of internet use is checked against educational attainment. Individuals who does not use the internet are assigned a value of zero, individuals who use the internet less than once in a week are assigned the value of 1, while those who use the internet at least once in a day are assigned the value of 2.

Surprisingly, the group with the least education has one of the most frequency of internet use in 2010; however, the trend was reversed in by 2012. I suspect this result is an outlier, or an original error in the survey data. I reduce the groups from two to three in other to check if the result is on outlier. The result is presented in Figure 12 below:

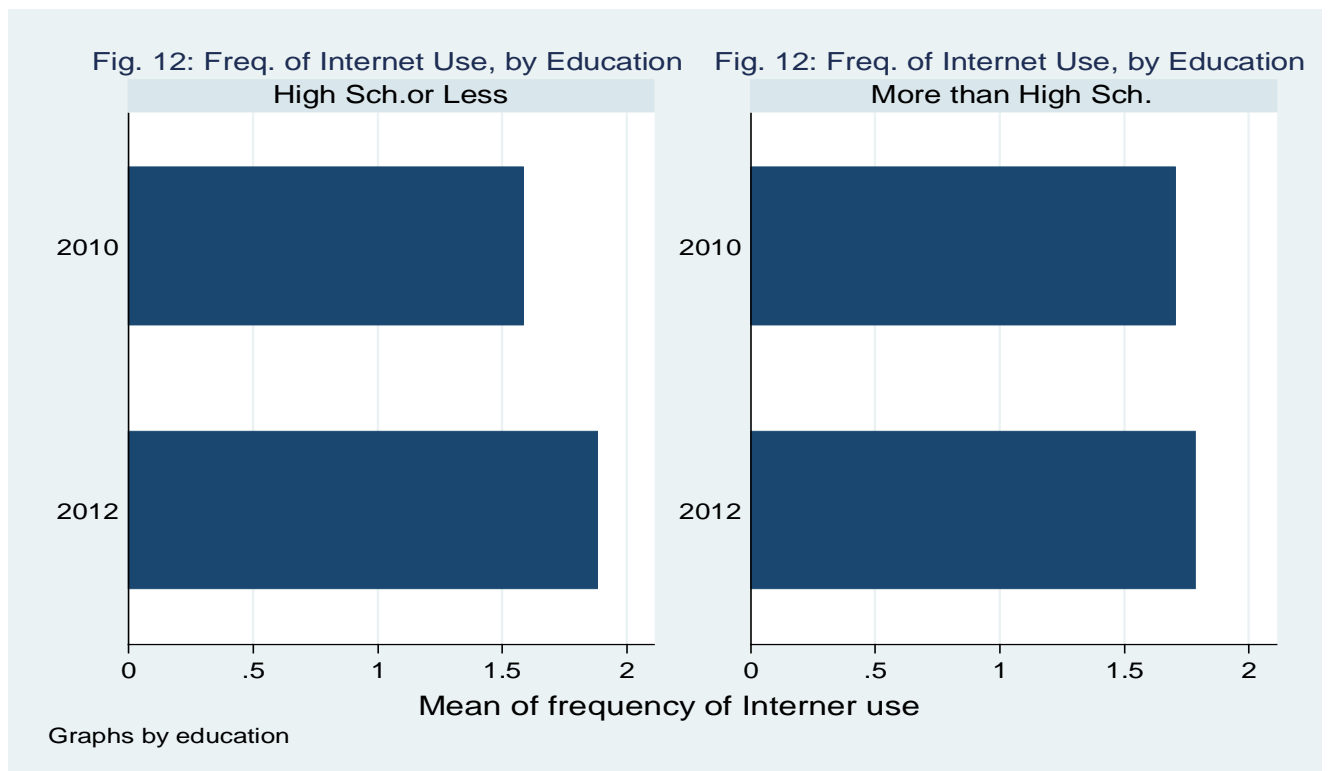
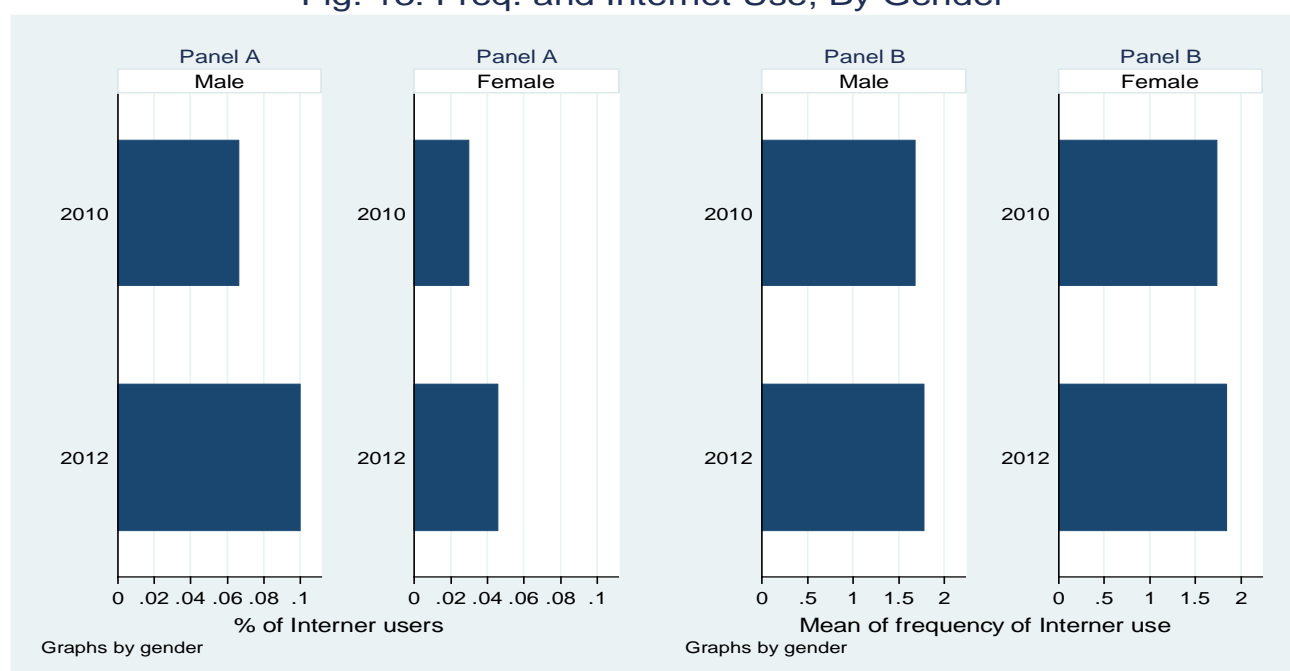


Figure 12 above has some muddled information as the one in the last figure. Thus, there is no clear-cut impact of education on frequency of internet use. Nevertheless, individuals who have more than high school education are likely to use the internet daily in both periods.

By gender, more males use the internet than females during 2010 and 2012 as shown in Panel A, Fig. 13 below. However, in terms of frequency of internet use, both genders are use the internet at roughly the same rate.

I maintain the same assigned values for males and females as those in Tables 5 and 6. Thus, the interpretation the values in panel A are quite straight forward: they represent the proportion of males who use the internet. The interpretation of the values in panel B follows a familiar pattern: 0 is assigned to those who do not use the internet at least one in a week, 1 to those who uses the internet at least one every week, and 2 to those who use the internet daily in the sample.

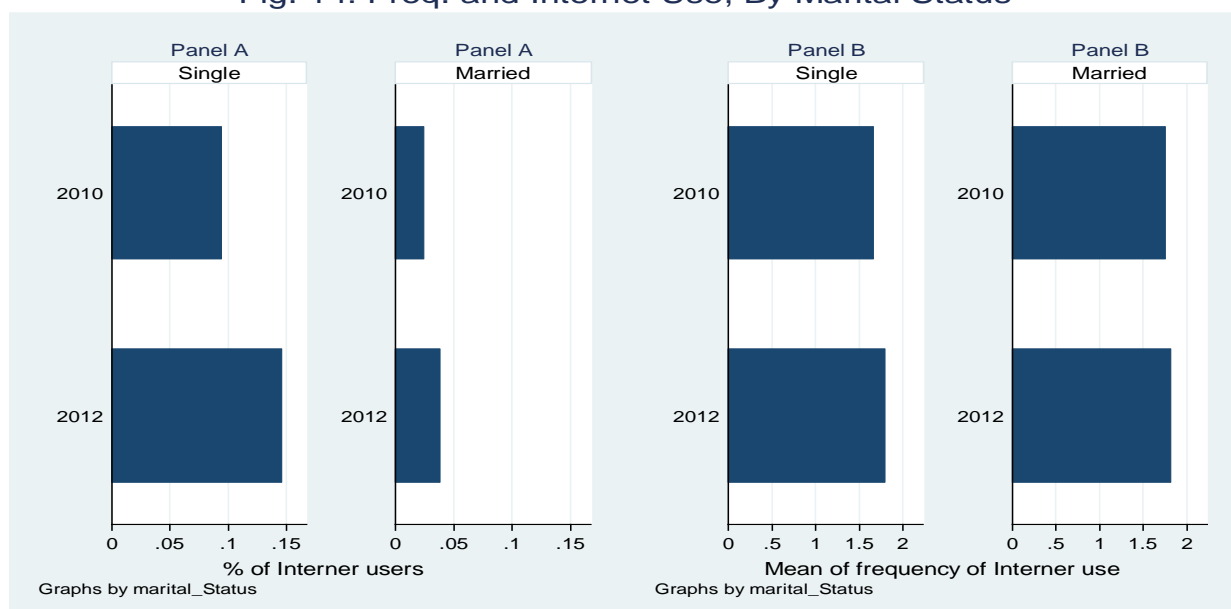
Fig. 13: Freq. and Internet Use, By Gender



Source: The Nigerian General Household Survey, Panel Component

The result of the frequency of internet use by marital status is shown in Figure 14 below. The interpretation figures on Panels A and B are quite straight forward: the single use the internet more frequently than the married.

Fig. 14: Freq. and Internet Use, By Marital Status



Source: The Nigerian General Household Survey, Panel Component

Average wages of internet users and non-users is presented in Figure 15 below. As expected, individuals who made more income are also likely to use the internet.

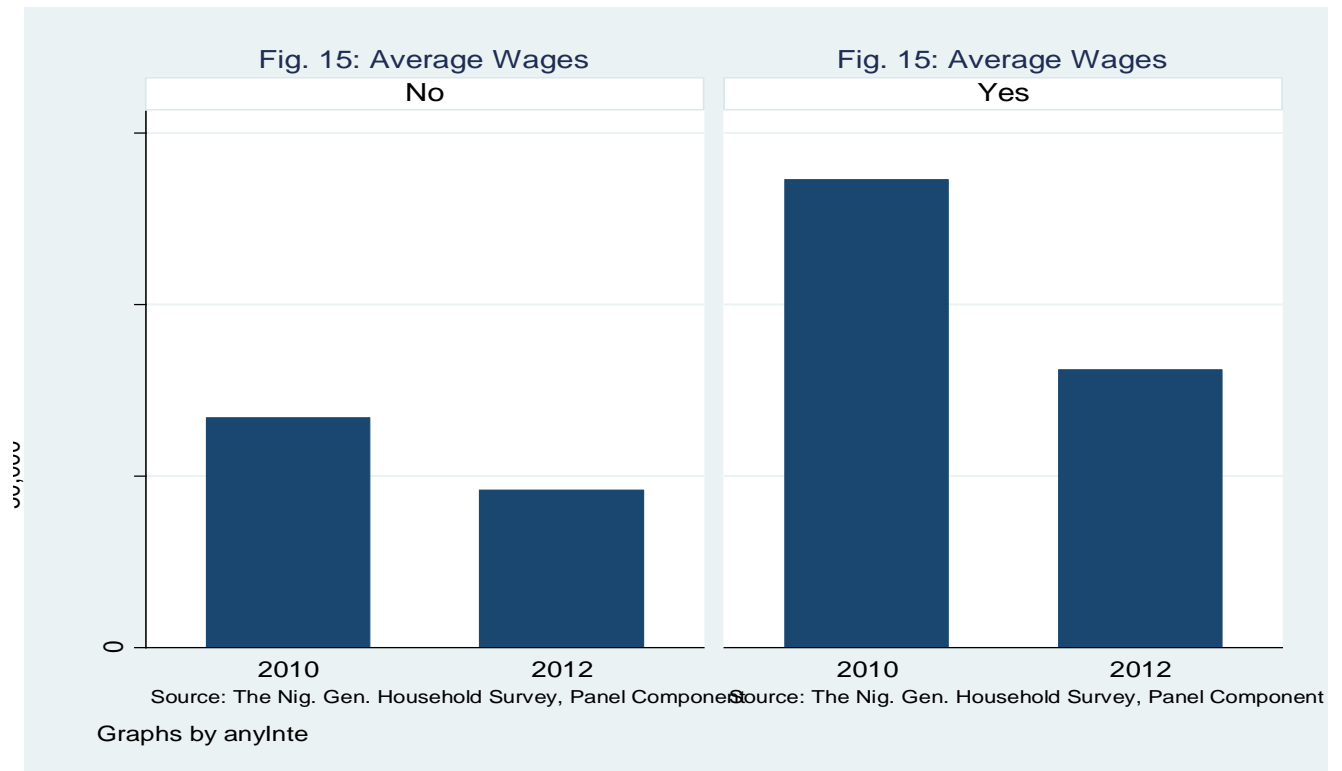
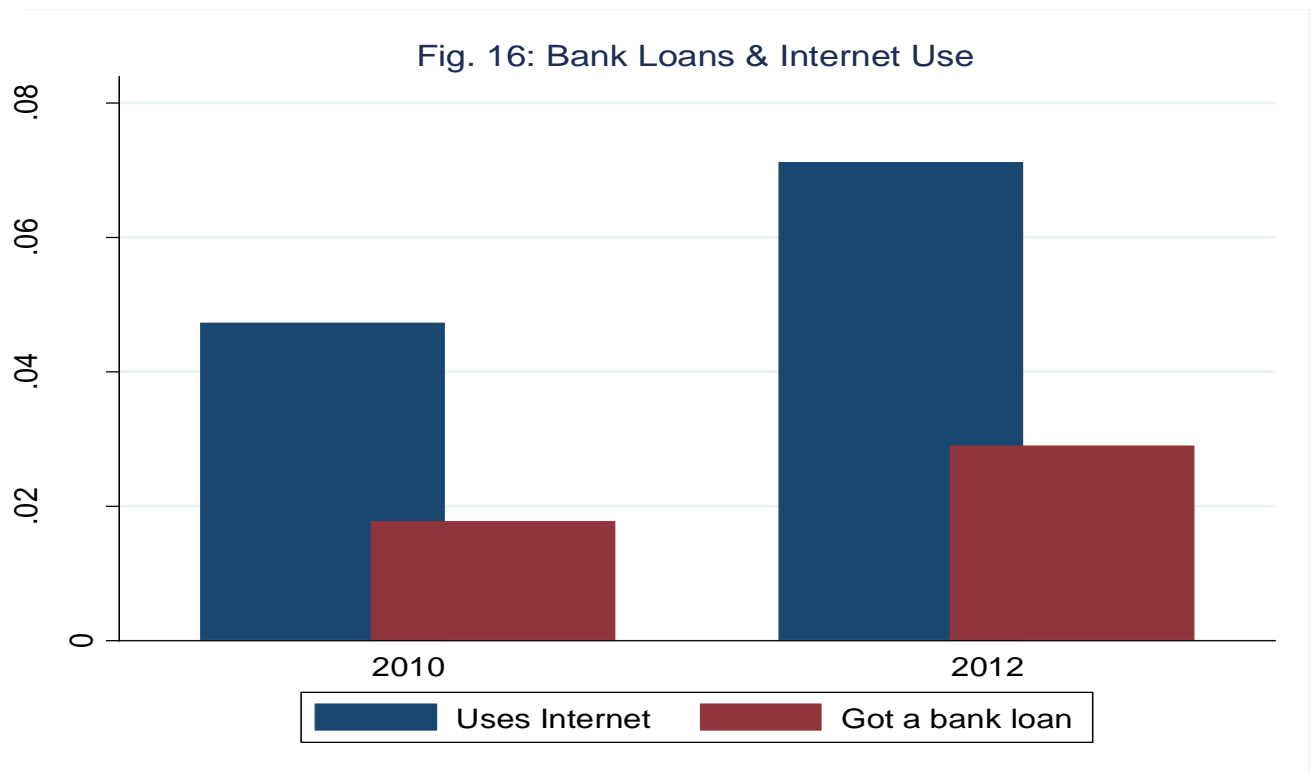
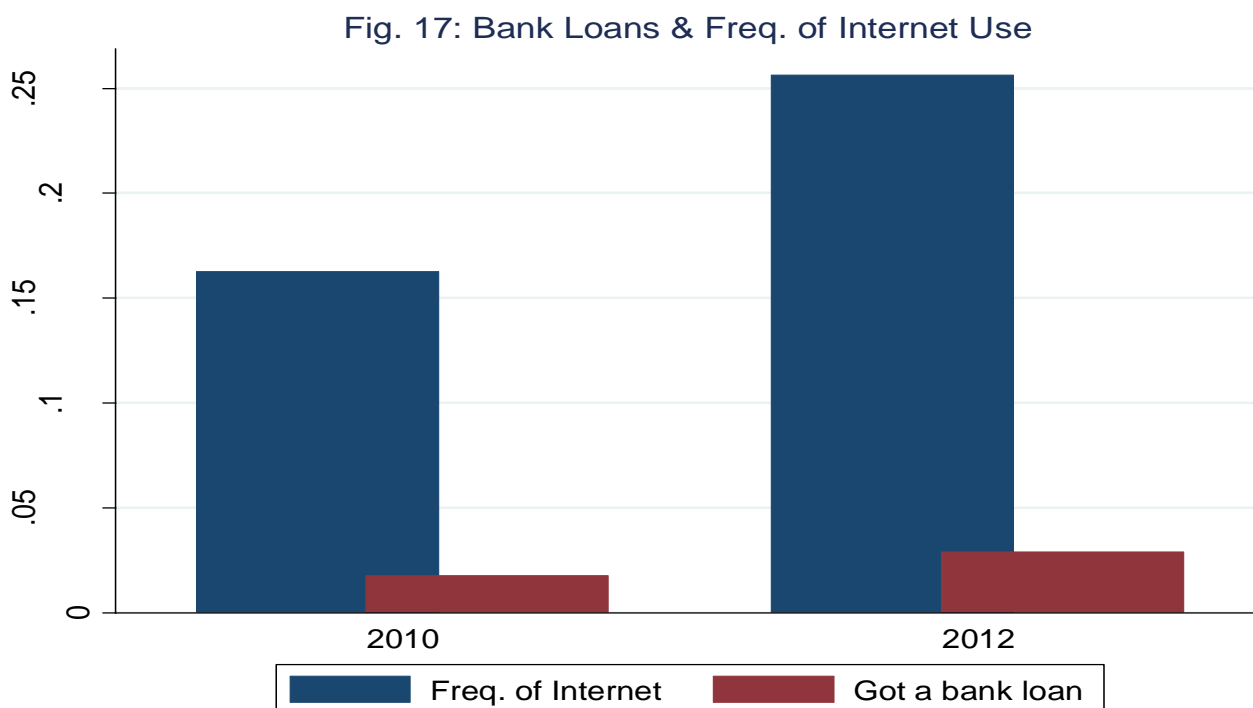


Figure 16 presents direct answer the second research question: evidence of the link between internet users and bank loans. The figure shows that the chance of getting a bank loan rises with more internet use. This result is consistent in the 2010 and 2012 waves. In 2010 for example, about 4.8% of the respondents uses the internet, while approximately 1.8% of the total sample got their loan application approved by Nigerian commercial banks. By 2012, internet users rose to 7.2%, and 2.8% of the respondents got a bank loan. This link between internet use and bank loan was also seen in the macro-level data presented in chapter 3.



Finally, I examine the link between frequency of internet and bank loan in Figure 17 below. To get a clear picture of the link between frequency of internet use and for easy interpretation of my results, I reduced the frequency of internet use from three to only two categories. Figure 17 below shows the link between frequency of internet

use and the chance of getting a bank loan.



4.3 Demography, Probability of Getting a Bank Loan and the Frequency of Using the Internet

This section analyses the demographic determinants of getting a bank loan with focus on the role that internet frequency plays. I answer the last research question in this chapter. A multivariate simple regression analysis is used to answer this question. The ordinary least squares regression equation is expressed as:

Bank Loan = f (frequency of internet use, gender, wage, marital status, employment status). Where bank loan is a variable that captures whether a respondent gets a bank loan or not. The other variables are exactly as I defined them in Tables 5 and 6. The regression result is presented in Table 7 below.

Table 7: Regression Result

VARIABLES	Bank Loan
Frequency	0.212*** (0.0166)
gender	0.0479 (0.0506)
Employment	0.184 (0.214)
Wage	0.0642*** (0.0217)
Educ.	0.0297 (0.0975)
Constant	-0.437 (0.288)
Observations	749
R-squared	0.082

The regression above shows that frequency of internet use is positively related to bank loan, and this result is significant. This result confirms what we have seen so far in chapter 3, 4, and now this chapter. Thus, univariate, and multivariate analysis both confirm that individuals who use the internet are likely to get a bank loan. This result is a very strong indicator of a successfully implementation of the liberalization of the ICT sector in Nigeria, and this policy seems to be robbing off on most sector of the Nigerian economy. This result is also very robust since I confirmed it at both aggregate level data and household level data.

Females are more likely to get a bank loan since female is coded with a value of one. However, this result is not significant, thus it seems that there is no evidence of discrimination based on gender in getting a bank loan approved. Employment status is also positive but not significant. Thus, employments status does not strongly explain the success of a bank loan application. Perhaps, some people lied about their

employment status to get their loans approved. Wage is positive as expected, and it is significant.

Thus, wages are strong determinant in getting a bank loan in Nigeria. Education is also positive as expected, but it is not significant. This result is not surprising given what we observed in Figures 11 and 12. The coefficient of determination is low: 8.2%, and this means that 8.2% of the factors that determine bank loan is explained by the regression analysis in Table 7. Thus, some other important factors that determine the chance of getting a bank loan is not stated in the regression due mainly to lack of sufficient data.

5. Discussion and Analysis

In this paper, I examine three research questions: how reforms in the banking sector impact banking activities in Nigeria, how the frequency of internet use determines the chance of getting a bank loan in Nigeria. I also examine how demographic factors affect the chance of getting a bank loan in Nigeria. I used two major data sources to analyze the issues raised in this paper: the World Bank development series data set and the panel component of the Nigerian General Household Survey.

I find that respondents who use internet frequently are more likely to get their bank loans approved, and this is after controlling for demographic variables like Age, gender, wage, marital status, and educational attainment. However, the coefficient of determination of my regression is very low, suggesting that some other important variables that determine the success of a bank loan application are not captured in the dataset.

Individuals who successfully tapped into the opportunity offered by the internet to get more information need to thank the liberalization of the Nigerian ICT sector carried out that was concluded in early 2000s. Thus, I checked the extent of the success of getting of the liberalization sector with the help of the World Bank data. I find out the liberalization of the Nigerian ICT sector played a huge role in cheap and affordable internet availability.

The adoption rate of the changes introduced by the ICT was a success story. I formally test the success of the ICT sector liberalization with a difference in differences of the means of mobile phone and landline adoption rate. My result supports a strong adoption rate of mobile phone technology, including using mobile phones as a primary device for connecting the internet. Not only is mobile phone for internet connection very cheap, cheap smart phones from China and other countries in the far eastern countries also played a role in this analysis.

However, I noted in my analysis that in the last section, some variables may not be accurately measured. Wage is a very good example of one of such variables. Some

people are paid in kind, and some people keep their wealth in livestock, especially in rural Nigeria. Perhaps this one of the reasons that the coefficient of determination is very low.

6. Conclusion

6.1 Main Findings

The main finding of this study is that frequency of internet strongly determines the success of getting a bank loan. This result is strongly supported by data at both households and aggregate levels. Individuals who use the internet daily is likely to get a bank loan approved. A lot reasons can be adduced for this result. Individuals who uses the internet frequently have another source of information in additional to traditional means of getting information such as radio and television. Because these individuals have more information than others who do not use the internet or not as frequent, they can easily know the kind of loans to pursue.

I also discovered that the liberalization of the ICT sector in Nigeria in the early 2000 makes ICT adoption very easy and cheap. High adoption rate in turn implies that people are connected to the internet cheaper than before, thus improving the quality of information available for everyone.

6.2 Implication for Business

The implication of my study for business is enormous. Figure 7, Panel B shows that export of ICT service as a percentage of total export is on the rise. Thus, local business in the Nigerian ICT sector can take advantage of this boom to earn foreign exchanges for themselves. Globacom, the biggest indigenous mobile phone company in Nigeria, has fully tapped into this opportunity. Globacom is the one of the main mobile phone providers across West African countries.

Apart from the export services, individual businesspersons also must gain as they can shop around for the best opportunity to get their bank loans approved. This may sound trivial to people in Western countries, but lack of bank loans for small-scale businesses is a huge problem in Nigeria. Since small scale enterprises (SMEs) are the bedrocks of most modern economies, the Nigerian economy will get a lot from the ease of doing business for SMEs.

6.3 Future Research

For future research, I would consider way of computing income. The socio-economic status index (SES) is one of such methods.

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http://microdata.worldbank.org/index.php/catalog/2734/get_microdata